PHYTOCHEMICAL COMPOSITION AND BIOACTIVITY OF WILD ALASKAN BERRIES

Joshua Kellogg[1], Jinzhi Wang[1], David Ribnicky[2], Peter Kuhn[2], Ilya Raskin[2], and Mary Ann Lila[1,3]
[1]Department of Natural Resources and Environmental Sciences, University of Illinois, 1201 S. Dorner Dr. Urbana, IL 61801, [2]Biotech Center, SEBS, Rutgers University, Foran Hall Rm 226, New Brunswick, NJ 08901, [3]Department of Food, Bioprocessing, and Nutrition Sciences, Plants for Human Health Institute, North Carolina State University, 600 Laureate Way, Kannapolis, NC 28081

Wild berries are fundamental components of traditional diet and medicine for Native American and Alaska Native (NA/AN) tribes and contain a diverse array of phytochemicals, including anthocyanins and proanthocyanidins, with known efficacy against metabolic disorders. In recent years, NA/AN communities have shifted away from traditional subsistence diets to a more Western commodity diet, and have begun to exhibit disproportionately high rates of metabolic syndrome, with type 2 diabetes incidences more than twice the national average. In this study, five species of wild Alaskan berries (*Vaccinium uliginosum, V. ovalifolium, Empetrum nigrum, Rubus chamaemorus*, and *R. spectabilis*) were first evaluated for potential bioactivity using the "Screens-to-Nature" (STN) approach in partnership with tribal members from three geographically distinct Alaskan villages. Subsequent analysis via HPLC and LC-MS^2 revealed significant species and location-based variation in anthocyanins (0.01-4.39 mg/g FW) and proanthocyanins (0.74-6.25 mg/g FW). A-type proanthocyanidins (dimers through tetramers) were identified in all species tested. Berries were analyzed for *in vitro* and *in vivo* activity related to diabetes and obesity. *R. spectabilis* samples increased levels of the adipogenesis-inhibitory enzyme preadipocyte-factor-1 (*pref-1*) by 82% over control, and proanthocyanidin-rich fractions from multiple species reduced lipid accumulation in 3T3-L1 adipocytes as much as 20%. Furthermore, extracts of *V. uliginosum* and *E. nigrum* reduced serum glucose levels in C57BL/6J mice up to 45%. Thus, wild Alaskan berries demonstrated a complex phytochemical composition and an ability to modulate specific cellular targets relating to metabolic syndrome. This research is supported by EPA STAR Research Grant No. EPA RD-83370701.